

CLAIMS

What is claimed is:

1. In an information services network having channels, each channel including a plurality of content items, at least one channel including items to be served from at least
5 one content server, where channel items vary over time, and items are replicated from origin servers to the content servers that serve the channel, a method of reporting replication status from the group of content servers in a channel comprising:
 - maintaining a channel description of content via a sequence of change events, each
event indicative of action for a particular file and each event having an associated
10 incrementing event number such that each successive event has an increasing event number;
 - identifying, upon completion of a particular change event, the event number corresponding to the event as completed;
 - reporting, for each of a plurality of content servers in the channel, an indication of
15 event completion via a threshold event number, the threshold number corresponding to a point of progression in the incrementing event numbers; and
 - aggregating reports from the plurality of content servers to obtain a global status report.
- 20 2. The method of claim 1 wherein the change event is add/delete for a particular file in the channel.
3. The method of claim 1 wherein the change events further comprise ordering categories, each of the change events corresponding to one of a plurality of ordering
25 categories, the ordering categories indicative of an alternate ordering criteria.
4. The method of claim 3 wherein the ordering category is indicative of a replication priority for the corresponding file.
- 30 5. The method of claim 3 wherein the ordering category is indicative of an origin server for the corresponding file.

6. The method of claim 1 wherein the threshold event number is a progression threshold for each of the ordering categories and the reporting further comprises the progression threshold for a plurality of ordering categories.

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7. The method of claim 3 wherein the channel description is maintained as status information in the content servers, the status information including the progression threshold within each of the ordering categories, wherein the replication status report omits transmitting cumulative, file specific information deterministic from the progression threshold.

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8. The method of claim 3 wherein the status report further includes an incomplete list, the incomplete list indicative of files having an event number previous to the reported event number for which event completion has not occurred.

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9. The method of claim 3 wherein the status report further report includes a present list, the present list indicative of files having an event number successive to the reported event number for the ordering category and for which the event is completed.

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10. The method of claim 1 wherein the indications of event completion further includes absolute and range references.

11. The method of claim 1 wherein aggregating includes obtaining the channel description from one of the content servers and interpreting status reports from content servers using the obtained channel description as a reference channel description.

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12. The method of claim 1 wherein the channel description has a maximum event number and each of the status reports also has a maximum event number, further including comparing that the maximum event number for the channel description is not less than the maximum event number of each of the status reports.

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13. The method of claim 11 further comprising validating the accuracy of the status report, accuracy being indicated such that the management server can interpret a status report if its highest event number is not greater than highest event number of the reference channel description.

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14. The method of claim 13 wherein if management server cannot interpret a report it refreshes information in the reference catalog such that reference channel description accurately reflects current information.

10 15. The method of claim 13 wherein if management server can interpret a report, it computes whether it can determine status of a particular content item, using the item's event number in the reference catalog, such that:

if the event number is greater than the largest event number sent in the status report, then the status of that item cannot be determined; and

15 if the event number in the reference catalog is equal to or less than the largest event number in the status report, an accurate report can be determined.

16. The method of claim 15 wherein if an accurate status report can be determined, examining the report for the ordering category corresponding to the particular content
20 item from the reference catalog, such that the particular content item is computed to be present if:

the corresponding event number is less than or equal to the threshold of that category; and

25 the corresponding event number is not in the incomplete list.

17. The method of claim 16 wherein the particular content item is computed to be present if the corresponding event number is listed in the present list.

18. The method of claim 15 wherein, if an accurate status report cannot be
30 determined, the management server selectively:

reports inability to compute the accurate status report, or

requests more current information from a content server such that the reference channel description reflects current information.

19. The method of claim 1 wherein aggregating the reports further comprises
5 computing a ratio of files which have been replicated at each of the set of content servers in the channel.

20. The method of claim 1 wherein aggregating the reports further comprises
10 computing a ratio of the content servers in the set which have replicated a particular file.

21. The method of claim 1 wherein the global status report is produced in response to an operator request.

22. A data communications device comprising:
15 a processor;
an interface to an information services network having channels, each channel including a plurality of content items, at least one channel including items to be served from at least one content server, where channel items vary over time, and items are replicated from origin servers to the content servers that serve the channel, a method of
20 reporting replication status from the group of content servers in a channel; and
a memory, the memory operable to store instructions, the processor operable on the instructions to:
maintain a channel description of content via a sequence of changes events each event change indicative of action for a particular file and each change having an
25 associated incrementing event number such that each successive event has an increasing event number;
identify, upon completion of a particular change event, the event number corresponding to the event as completed;
report, for each of a plurality of content servers in the channel, an indication of
30 event completion via a threshold event number, the threshold number corresponding to a point of progression in the incrementing event numbers; and

aggregate reports from the plurality of content servers to obtain a global status report.

23. The data communications device of claim 22 wherein the change events further
5 comprise add and delete events for a particular file in the channel.

24. The data communications device of claim 22 wherein the change events further
comprise ordering categories, each of the change events corresponding to one of a
plurality of ordering categories, the ordering categories indicative of an alternate ordering
10 criteria.

25. The data communications device of claim 24 wherein the status report further
report includes an incomplete list the incomplete list indicative of files having an event
number previous to the reported event number for which event completion has not
15 occurred.

26. The data communications device of claim 24 wherein the status report further
report includes a present list, the present list indicative of files having an event number
successive to the reported event number for the ordering category and for which the event
20 is completed.

27. The data communications device of claim 24 wherein the ordering category is
indicative of a replication priority for the corresponding file.

25 28. The data communications device of claim 24 wherein the ordering category is
indicative of an origin server for the corresponding file.

29. The data communications device of claim 22 wherein the threshold event number
is a progression threshold for each of the ordering categories and the reporting further
30 comprises the progression threshold for a plurality of ordering categories.

30. The data communications device of claim 24 wherein the channel description is maintained as status information in the content servers, the status information including the progression threshold within each of the ordering categories, wherein the replication status report omits transmitting cumulative, file specific information deterministic from the progression threshold.
31. A method for reporting replication status of media content in a content delivery network (CDN) comprising:
- identifying a set of content items for replication at a content server;
 - enumerating content items received, via the replication, at the content server from the identified set of content items; and
 - reporting the enumerated content items received by indicating a progression threshold in the identified set corresponding to the enumerated content items.
32. The method of claim 31 further comprising subdividing the identified set of content items into ordering categories indicative of a subset of the identified content items and reporting further includes reporting the progression threshold for each ordering category.
33. The method of claim 32 wherein the ordering categories are further indicative of a priority for a subset of the content items from the identified set of content items to be stored at the content server.
34. The method of claim 32 wherein the ordering categories are further indicative of an origin server from which the subset of identified media items emanates from.
35. The method of claim 31 wherein reporting further comprises reporting an incomplete portion indicative of identified content items within the progression threshold which have not yet been received at the content server.

36. A data communications device for reporting replication status of media content in a content delivery network (CDN) comprising:

at least one content server operable to receive a channel manifest identifying a set of content items for replication at the content server and further operable to fetch the

5 identified content items from at least one origin server in communication with the content server;

a catalog indicative of content items in the channel manifest received by the content server from the origin servers;

10 a replication status daemon operable to enumerate content items received at the content server from the identified set of content items in the channel; and

a replication status reporter operable to report the enumerated content received by indicating a progression threshold in the identified set of content items corresponding to the enumerated content received by the content server.

15 37. The data communications device of claim 36 further comprising a plurality of order categories, wherein the replication status reporter is operable to subdivide the identified set of content items into ordering categories indicative of a subset of the identified content items and further operable to report the progression threshold for each ordering category.

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38. The data communications device of claim 37 wherein the ordering categories are further indicative of a priority for a subset of the content items from the identified set of content items to be stored at the content server.

25 39. The data communications device of claim 38 wherein the ordering categories are further indicative of an origin server from which the subset of identified media items emanates from.

40. The data communications device of claim 36 wherein the replication status reporter is further operable to report an incomplete portion indicative of the identified
30 content items within the progression threshold which have not yet been received at the content server.

41. A method for generating replication status reports indicative of a replication status of media content items in a content delivery network (CDN) comprising:

identifying a plurality of content channels, each of the content channels having at
5 least one content server operable to receive, store, and deliver content items to a plurality of users;

enumerating a plurality of media content items within each of the identified channels, the channels indicative of a relationship to a plurality of users;

identifying at least one origin server in communication with the content servers,
10 the origin servers having media content items corresponding to the content channels;

replicating, by transmitting from the origin servers to the content servers, the enumerated content items;

identifying, by an event number, the transmitted content items received by each of the content servers;

15 computing a progression threshold indicative of the transmitted content items; and

generating, by a replication status reporter at each of the content servers, a replication status report indicative of the progression threshold event numbers.

42. The method of claim 41 further comprising ordering categories, each of the
20 ordering categories indicative of subdividing the enumerated content items within the channels, the ordering categories indicative of priorities for replicating the content items.

43. The method of claim 42 wherein the ordering categories further comprise a subdivision according to a respective origin server from which the content items emanate.
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44. The method of claim 42 wherein the replication status report further comprises a set of event numbers corresponding to content items which have been received by the content server.

30 45. A system for propagating media content and reporting replication status of media content in a content delivery network (CDN) comprising:

at least one content server operable to identify a set of content items for replication at a content server;

5 a replication status daemon in the at least one content server operable to enumerate content items received at the content server from the identified set of content items; and

a replication status reporter in the at least one content server operable to report the enumerated content received by indicating a progression threshold in the identified set corresponding to the enumerated content items.

10 46. A computer program product having a computer readable medium operable to store computer program logic embodied in computer program code encoded thereon for reporting replication status of media content in a content delivery network (CDN) comprising:

15 computer program code for identifying a set of content items for replication at a content server;

computer program code for enumerating content items received at the content server from the identified set of content items; and

20 computer program code for reporting the enumerated content received by indicating a progression threshold in the identified set corresponding to the enumerated content items.

47. A data communications device for reporting replication status of media content in a content delivery network (CDN) comprising:

25 means for identifying a set of content items for replication at a content server;

means for enumerating content items received at the content server from the identified set of content items; and

means for reporting the enumerated content received by indicating a progression threshold in the identified set corresponding to the enumerated content items.